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Allis-Chalmers Company

Mining Machinery Department

Bulletin No. 1403 **Reprint** **February, 1911**

The Hancock Jig

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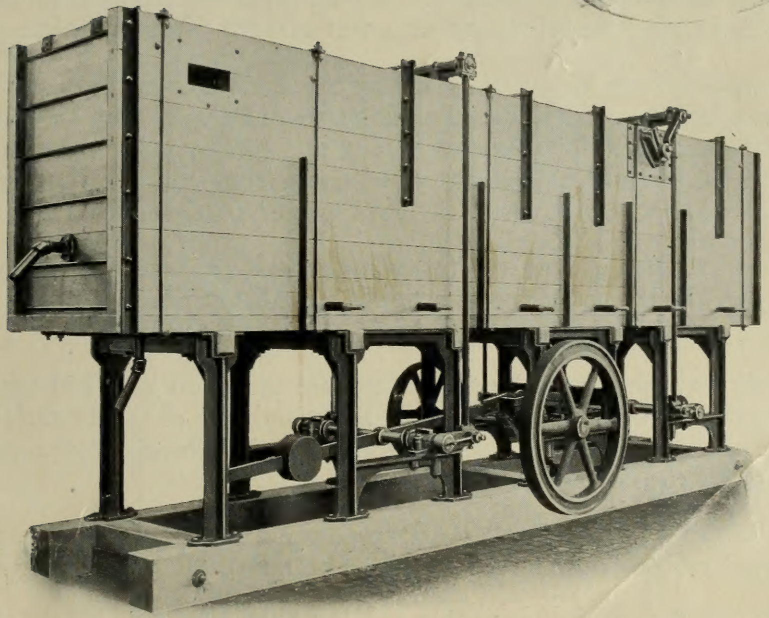

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Year of Issue 1911
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Hancock Jig

This machine is of Australian origin, and was originally invented by Mr. H. R. Hancock, then General Manager of the Moonta Mines in South Australia. Up to the time of its invention the mines in that district were not profitably dealing with the low-grade ores (chalcopyrite and bornite). This was, however, accomplished by means of the Hancock Jig.

When Mr. Hancock assumed control of the Wallaroo Mines, South Australia, he found great heaps of low-grade ore on the surface. This ore was considered too refractory for any method of water concentration. He at once installed his jigs and converted these so-called waste heaps into a valuable asset.

When the oxidized ores of the silver and lead mines in Broken Hill, N. S. W., were becoming exhausted, the mine owners saw that it was imperative to deal with the enormous bodies of low-grade ore (lead-silver, zinc-blende, etc.), for which no method of profitable treatment had hitherto been discovered. Mr. Hancock was induced to erect a small experimental plant at the Wallaroo Mines, to try to solve the problem, and was so successful that his jigs were immediately introduced in the Broken Hill district, and the profitable treatment of these refractory ores was assured from that time onward.

After its successful use for several years on the above low-grade ores of Australia, the Hancock Jig was introduced into the United States, where it has since been built by Allis-Chalmers Company, and its success as a coarse concentrating machine has been no less marked on the ores of this country, where in some districts, referred to in this bulletin, its use has almost completely replaced former coarse concentration methods.

This success has been due to the following general characteristics, which have been proved in many of the largest coarse concentrating mills in this country, as mentioned in this bulletin:

First. Ability to treat very large tonnages up to as much as 800 tons in 24 hours, the tonnage depending upon the mineral contents and size of the material treated. Although capable of treating these very large tonnages, the same jig, by proper adjustment, will handle 100 tons equally as well.

Second. Requires only a fraction of the power necessary for the many plunger jigs of the same capacity, the power required for a standard 25 ft. jig being 4 to 5 H. P.

Third. The water required is very much less than that for plunger jigs of the same capacity, the only water required being that necessary to replace the water used in the drawing off and disposition of the several products, concentrates, middlings, tailings. If it is possible to give the jig sufficient elevation or if the different products are drawn off intermittently, very little water will be necessary.

Fourth. The jig has been found to work equally as well upon classified feed as upon sized feed, even with a very wide range of sizes. Owing to this characteristic, it is a customary practice to classify the material up to 10 or 12 m. m. in a special classifier, taking out the slimes and fines up to 20 or 30 mesh, the spigot product of the classifier going to the jig, thus doing away with sizing screens other than an oversize screen.

Fifth. Upon the same ore the Hancock Jig will make as clean a concentrate, a better middling, and a much lower tailing than jigs of the plunger type. This is due to the peculiar motion imparted to the sieve, which allows of better stratification and a sharper separation of the mineral particles.

MECHANICAL DESCRIPTION OF JIG

The following brief description of the jig will be readily understood by referring to outline of the jig shown on page 4 and also to list of parts for 25 ft. jig, pages 7 and 8.

The jig is of the moving screen type, the stratification of the ore under treatment being effected by the rise and fall of the screen tray in the water of the jig-box. The jig-box, of 4-in. lumber, is 25 ft. long by 4 ft. 2 in. wide by 5 ft. 9 in. high in outside dimensions and is divided by partitions into six compartments, five of these forming the hutches below the screens and the sixth receiving the tailings. In the sixth compartment there is also a partition for the separation of slimes for retreatment, in case unclassified material is being treated. The hutch partitions may be changed to suit conditions. The concentrates, middlings and tailings are drawn off on one side of their respective compartments by gates or plugs, either continuously or intermittently.

The jig-box is supported upon cast-iron legs, bolted to a 12-in. foundation frame; the cast-iron legs also carry the shaft-boxes No. 14. The tray carrying the screens hangs inside the jig-box, suspended from supports No. 45 and No. 46.

The driving mechanism consists of a cam-shaft, No. 1, upon which are keyed a 3-point cam, No. 38, as well as driving pulley, and fly-wheel, No. 39. This shaft revolves at 60 to 65 R.P.M., imparting 180 to 195 reciprocations to the tray. The points of the cam engage two long rocker-arms, No. 32 and No. 33, which are supported by two rocker-shafts, No. 2, one at each end of the jig. These two long rocker-arms are connected together by two links, No. 37, the cam engaging a wearing-plate, No. 34, on the lower of the two arms, thus imparting the reciprocating motion to these arms. To the four extremities of the rocker shafts, which extend beyond the sides of the jig, are keyed four short rocker-arms, No. 22, which carry vertical connecting rods, No. 51, attached above to tray supports, No. 45 and No. 46, from which the tray is suspended. On each side of the jig-box is attached a quadrant, No. 25, connected to tray support, No. 45, by connecting links, No. 26. By means of this latter mechanism the forward motion is imparted to the tray.

From the foregoing description it will be seen that the tray is given a combined vertical and horizontal reciprocating movement, the upward and forward motion being imparted to it by the cam and connecting links, No. 26, the downward and backward motion by gravity and the connecting links. As a result of this motion the ore is moved rapidly over the screens, the heavy mineral being taken down in the first three hutches, the middlings (to be reground) in the fourth and fifth hutches and the tailings passing over the end of the tray. Special discharges for the removal of concentrates or middlings from

THE HANCOCK JIG

Plate 1954

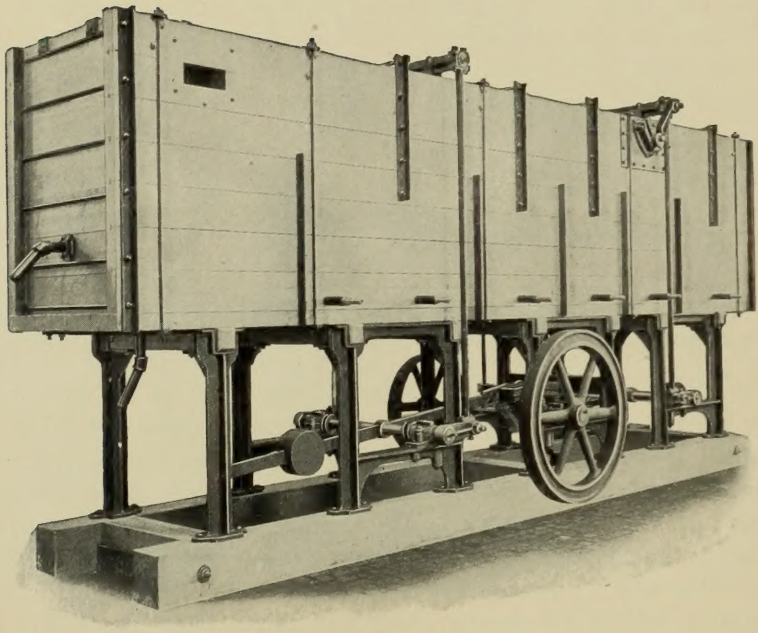
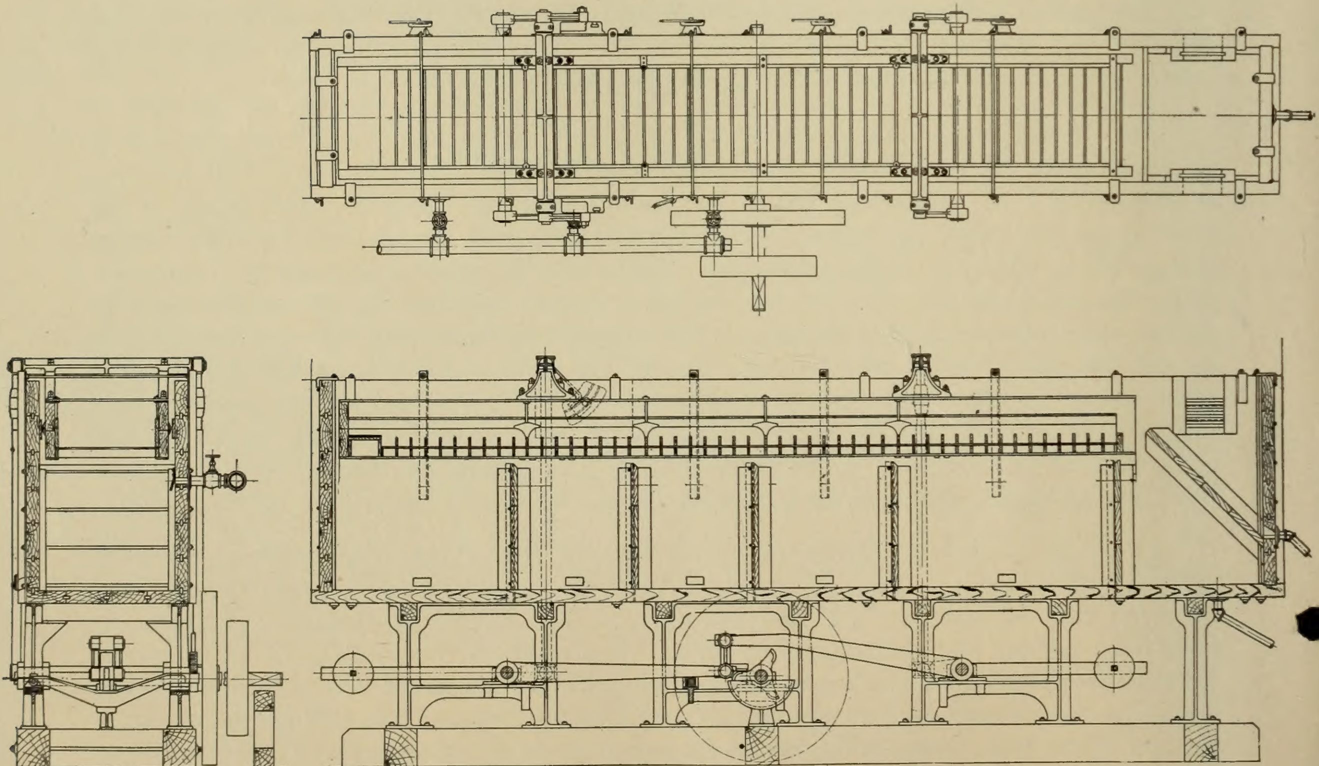


Plate 3234



the top of the screen can be supplied when required. This is very seldom necessary, however, owing to the very large screen area.

It might be mentioned here that Allis-Chalmers Company also manufactures a smaller Hancock Jig, with jig-box, of the following dimensions: 18 ft. 6 in. long, 4 ft. 5 in. wide and 5 ft. high. This 18-ft. jig was designed for use in mills with a capacity up to 150 or 200 tons, and is the jig shown in diagram on page 10. It was also designed to supply the demand for a smaller jig to be used in conjunction with our 25 ft. jig in treating the middlings from the larger machine after regrinding. In its essential features it is exactly similar to the 25 ft. jig, the main difference being in the jig-box, which is provided with five instead of six compartments. The H. P. required is approximately three.

DIRECTIONS FOR ERECTING AND OPERATING THE HANCOCK JIG

It is essential that the foundation frame be set level on a good substantial foundation, preferably of concrete or stone. The cam-shaft and rocker-shafts should be leveled and squared with the jig. The tray must be level transversely, also longitudinally, though a slight fall toward the tail end will increase the capacity, if so desired.

The tray must hang freely in the jig-box, with a clearance of about ⅛ in. between the wearing strips. This is essential, as the down stroke of the tray depends entirely upon gravity and any binding will affect the stroke. On the other hand, too great a clearance will result in water splashing up between tray and box, and will also reduce the pulsive effect of the water rising through the ore bed as the tray is on the down stroke. This clearance is easily regulated by the tie-rods.

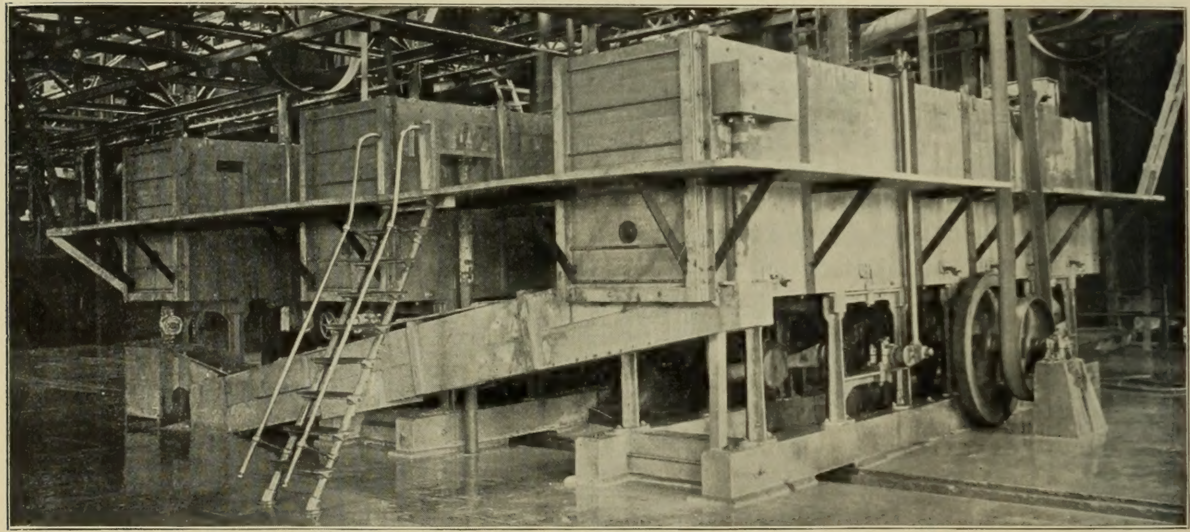
The side connecting-rods, No. 51, should be perpendicular when the tray is at the low point of stroke.

WATER.—In operating, the water level is carried three or four inches above the material on the jig. This water level is kept permanent by providing for an overflow at the rectangular outlet in the jig-box at the tail end.

In addition to the water introduced with the feed, fresh water is also provided in the first three hutches. The amount of this water has considerable effect upon the quality of the products taken down in these hutches, as it will be readily seen that if very little water is introduced, the suction, down through the ore bed, will be greatly increased on the rising stroke of the tray. On the other hand, if little water is provided with the feed and much clear water is supplied from below, a classifying effect will be produced which is desirable on lean ores with a large percentage of fines in the feed. Under the latter conditions the screens will not "blind" so readily.

SCREENS.—The tray mentioned above is fitted with the screen frames. The lower frame consists of hardwood side pieces, into which cross-bars or "slats" of hardwood are mortised. Upon this lower frame are placed the screens and upon the screens, holding them securely in place, is the upper frame with "slats" corresponding with those of the lower frame. This upper frame, with "slats" 3 to 3½ in. high, serves the purpose also of holding the permanent bedding or "ragging", which serves to keep out gangue from the first three hutches and allows only clean concentrates to pass continuously through the screens. In fitting the jig with screens, consideration must be given to the size of material and also mineral contents. The first hutch is supplied with the finest screen and will receive the finest concentrates, the second receives the medium-sized and the third the coarsest concentrates. At least a part of the third hutch screen must have apertures large enough to allow of the passage of the maximum size of free mineral particles in the feed. Usually woven wire will be found more satisfactory for the first three hutch screens and these screens should be nailed to the lower frame as in the case of plunger type jigs, in order to prevent movement of the screen and consequent "boiling". The "slats" of the upper frame should fit tightly enough upon the screen to prevent "creeping" of the permanent bedding. The fourth and fifth hutches, where middlings are usually made—all the free mineral having been taken out in the first three—may be supplied with punched steel screens and, in case of lean ores, bedded with artificial bedding, such as iron punchings or some heavy mineral. The size of hole in the fifth hutch screen should be slightly larger than that of the trommel supplying the jig with feed.

Plate 5793



A Group of Three Hancock Jigs in the Federal Lead Company's Mill, Flat River, Mo.

STROKE.—The stroke of the jig is entirely under the control of the operator. Vertical and horizontal adjustments may easily be made to insure "free" bed and allow of perfect stratification.

The "forward" throw is regulated by the connecting link bolts, No. 27, and washers, No. 31, also by moving quadrant bolts, No. 8, up or down in the quadrant. Care should be taken to have the connecting links on both sides of the jig set at the same angle, and with the same amount of lost motion between the connecting links and connecting link boxes, No. 30. The vertical throw is regulated by the adjusting-bar, No. 36, and screw, No. 6. The rubber in the adjusting-bar should always receive the force of the falling rocker-arm, and in no case should the arm be allowed to fall directly upon the cam. The bed of ore on the sieves must be kept level and the tailings must be discharged evenly across the sieve. This can be controlled readily by adjustment of the connecting links, No. 33.

All bearings should be kept well oiled, allowing rocker-shafts, No. 2, and rocker-arm pins, No. 7, to work freely and thus avoid retarding the fall of the tray on the down stroke.

In starting the jig have the rocker-arm, No. 33, raised clear of the cam, have bedding in place on the screens, fill jig with water, turn on the feed, and gradually lower adjusting-bar until the desired amount of stroke is reached.

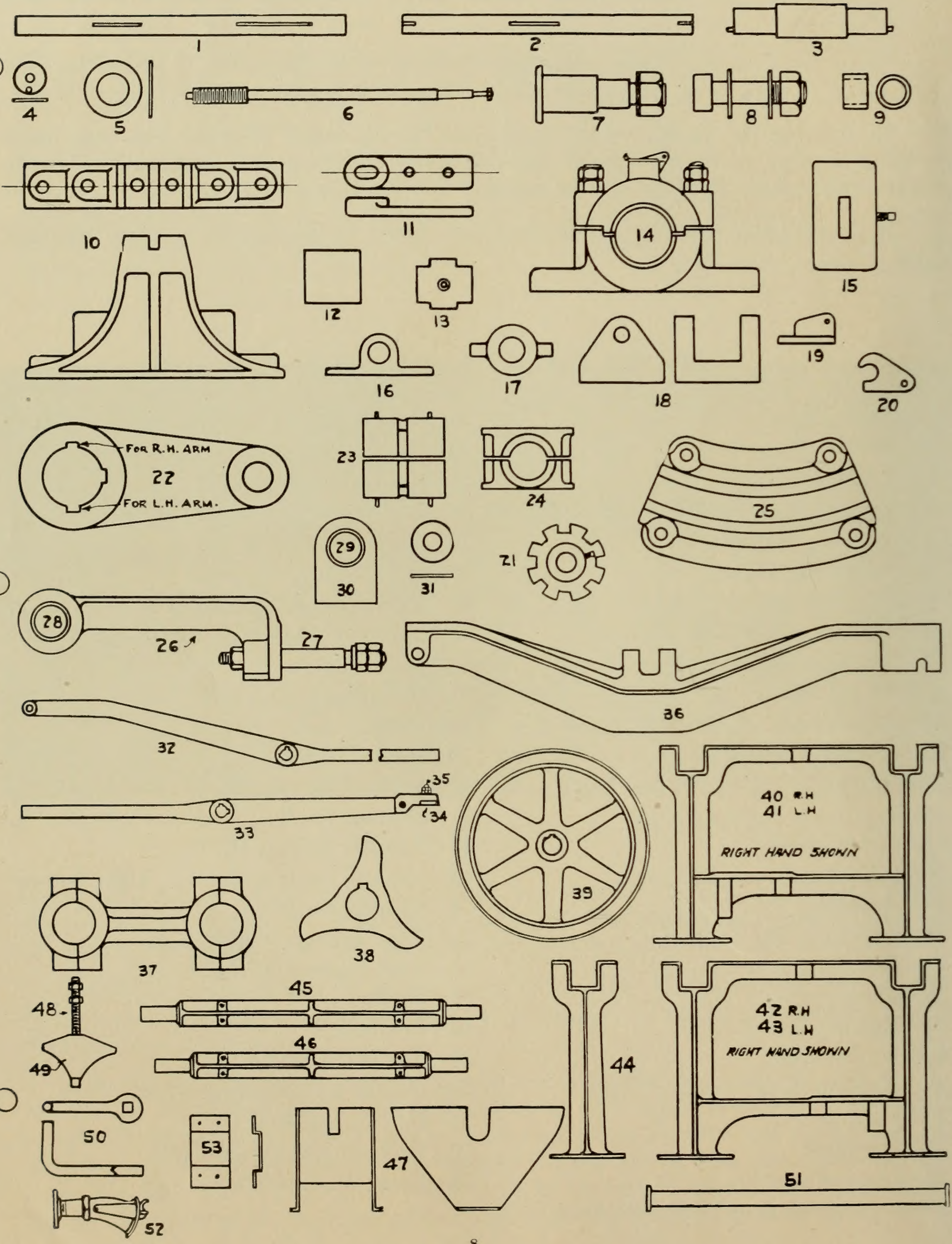
If conveniently situated one operator can attend to the running of three Hancock Jigs.

LIST OF PARTS FOR HANCOCK JIG

1—Main Shaft.
2—Rocker Shaft.
3—Rocker Arm Pin—"A".
4—Bearing Plate for Rocker Arm Pin.
5—Washer for Rocker Arm Pin.
6—Adjusting Screw.
7—Rocker Arm Pin—"B".
8—Quadrant Bolt.
9—Sleeve for Quadrant Bolt.
10—Tray Hanger.
11—Adjusting Screw Support.
12—Rubber Bumper.
13—Bumper Plate.
14—3⅞″ Plain Rigid Flat Box.
15—Counterweight.
16—Adjusting Screw Bracket.
17—Adjusting Nut.
18—Adjusting Bar Support.
19—Ratchet Plate.
20—Pawl.
21—Ratchet Wheel.
22—Rocker Arm.
23—Bushing for Connecting Link.
24—Journal Box.
25—Quadrant.
26—Connecting Link.
27—Connecting Link Bolt, with Nuts.
28—Bushing for Connecting Link.
29—Bushing for Connecting Link Box.
30—Connecting Link Box.
31—Washer for Connecting Link.
32—Rocker Arm.
33—Rocker Arm.
34—Phos. Bronze Wearing Plate for Same.
35—¾″x4¼″ Plow Bolt for Rocker Arm.
36—Adjusting Bar.
37—Connecting Link and Cap.
38—Cam.
39—Fly Wheel.
40—Support for Box (R. H.).
41—Support for Box (L. H.), Right Shown.
42—Support for Box (R. H.).
43—Support for Box (L. H.), Right Shown.
44—Support for Box.
45—Tray Support 5′-6¾″ L. G.
46—Tray Support 5′-1¼″ L. G.
47—Oil Box.
48—Tee Bolt.
49—Tee Bolt Casting.
50—Handle for Adjusting Screw.
51—Connecting Rod.
52—Perfection Molasses Gate.
53—Brass Wearing Plate.

25 FOOT HANCOCK JIG. LIST FOR REPAIRS.

Plate 6179



From the description of the Hancock Jig on the previous pages it will be noted that the installation of Hancock Jigs in a coarse concentrating plant will greatly reduce operating costs in labor and repairs by their ease of operation and simplicity of construction, and will simplify the construction of the plant by doing away with the necessity for extra screens and their necessary drives and launders. This is very clearly shown by reference to the diagrams on pages 10 and 11, illustrating the plan and elevation of one of Allis-Chalmers improved concentrating mills using a Hancock Jig and Richards Classifiers, and also a flow sheet graphically showing the operation of the plant. On pages 12 and 13 are similar diagrams showing plan and elevation of one of this Company's improved concentrating mills using Hartz Jigs; also a flow sheet graphically showing operation of this type of mill. Either mill is adapted for coarse concentration of copper or lead ores, with fine grinding for the middlings produced by the jigs and subsequent fine concentration on tables and vanners. Both of these plants are models of the latest practice for coarse concentration of ore but are, of course, subject to modifications to suit variations in the ore to be treated.

Attention is directed in these diagrams to the following differences brought about by the use of the Hancock Jig and Richards Annular Classifier in the coarse concentrating departments of the two plants shown, the crushing and fine concentrating departments being the same in both cases.

First. The floor space and head-room for the Hancock Jig and Huntington Mill is considerably reduced, as compared with that in the Hartz Jig mill.

Second. There is required one trommel, returning oversize to a pair of secondary rolls, and one Annular Classifier taking out 30-mesh material and finer for the fine concentrating section of the mill, as compared with four trommels and one cone classifier with their drives, launders and water piping.

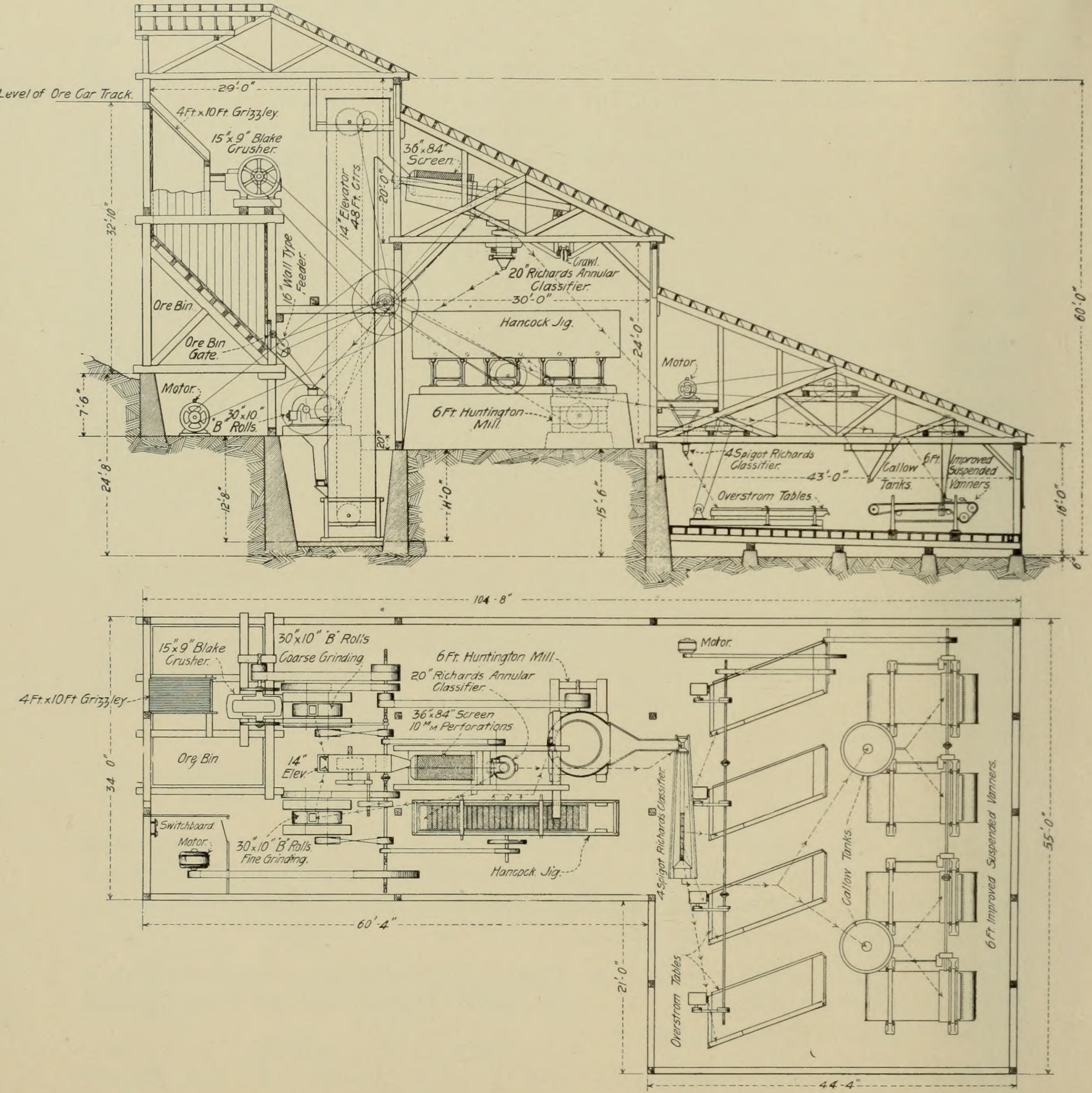
Third. No countershaft is required for the Hancock Jig and Huntington Mill, power being derived from the main line shaft for these two machines.

Fourth. Practical mill men will appreciate the use of one coarse concentrating machine, such as the Hancock Jig, in place of the many Hartz Jigs with their feed and tailings launders, concentrates and middlings discharges, screens and water piping, etc., all of which require attention and repairs.

Fifth. The horse-power required for Hancock Jig and single trommel as shown in the diagram is approximately 5. The horse-power required for the Hartz Jigs and trommels as shown is approximately 25.

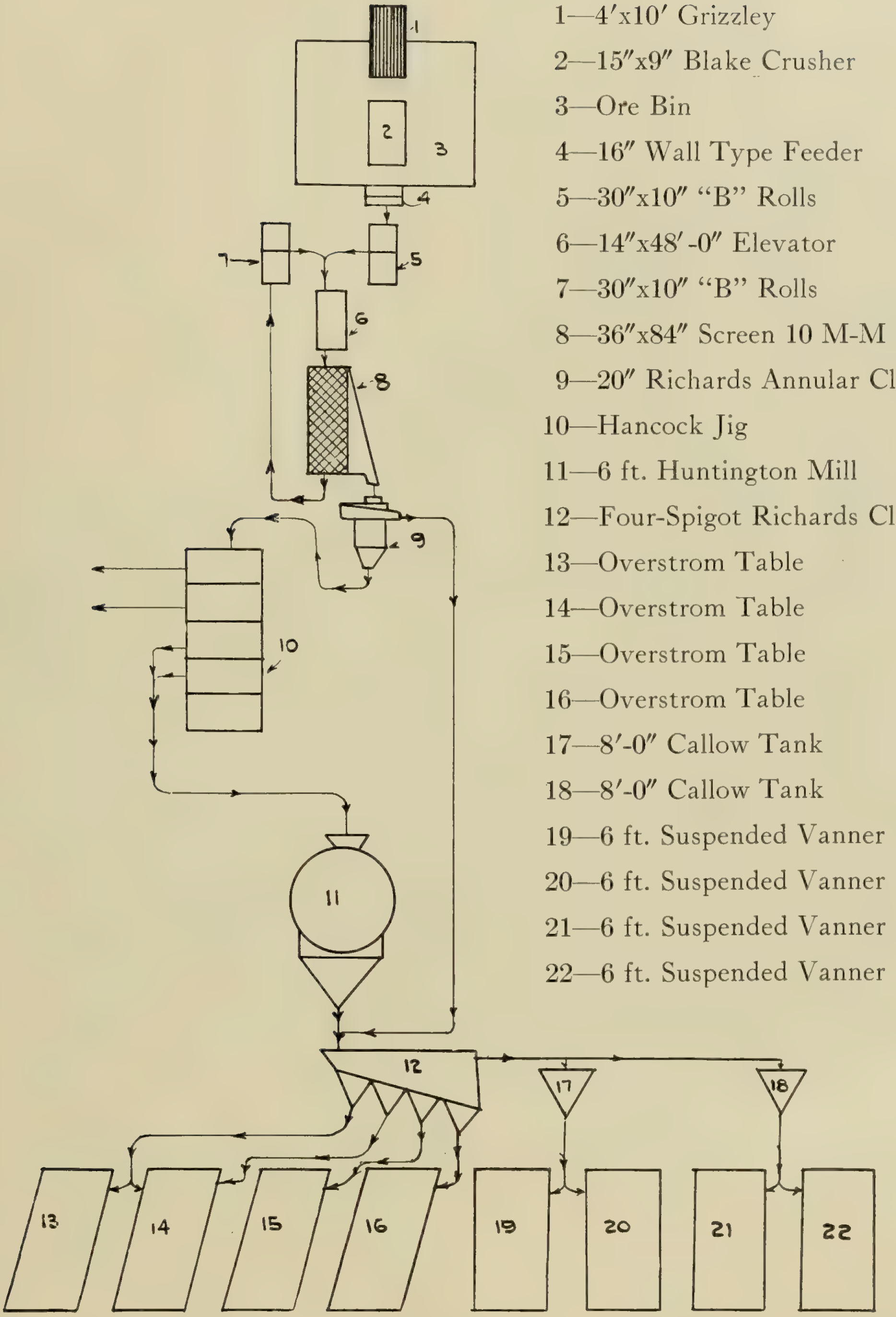
Owing to the above advantages the initial cost of concentration of a mill equipped with Hancock Jigs and Classifiers is very greatly reduced.

Plate 5312



Plan of 150 to 200 Ton Concentrating Mill Using Hancock Jig and Richards Classifiers

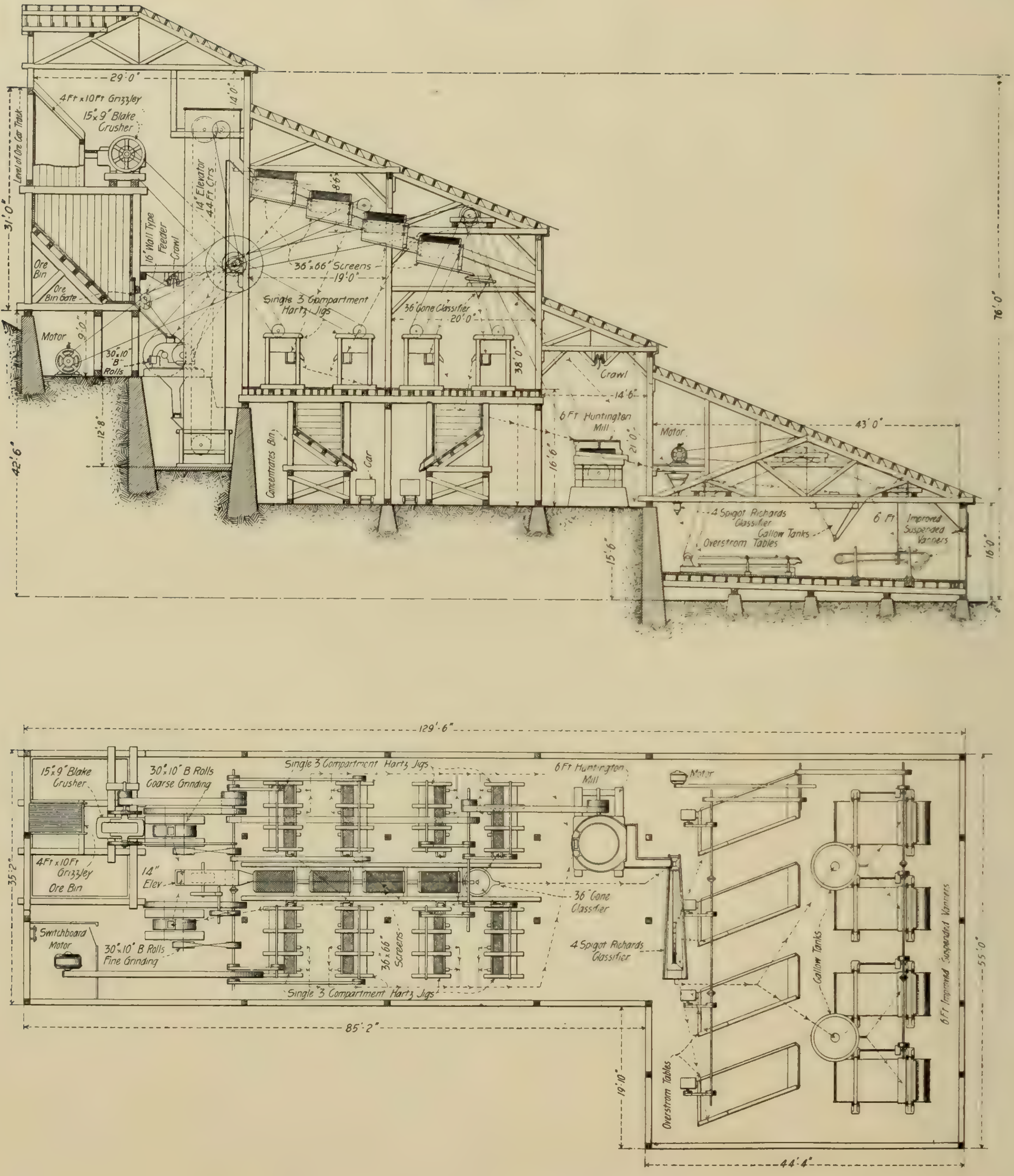
Plate 5310



1—4′x10′ Grizzley
2—15″x9″ Blake Crusher
3—Ore Bin
4—16″ Wall Type Feeder
5—30″x10″ "B" Rolls
6—14″x48′-0″ Elevator
7—30″x10″ "B" Rolls
8—36″x84″ Screen 10 M-M Holes
9—20″ Richards Annular Classifier
10—Hancock Jig
11—6 ft. Huntington Mill
12—Four-Spigot Richards Classifier
13—Overstrom Table
14—Overstrom Table
15—Overstrom Table
16—Overstrom Table
17—8′-0″ Callow Tank
18—8′-0″ Callow Tank
19—6 ft. Suspended Vanner
20—6 ft. Suspended Vanner
21—6 ft. Suspended Vanner
22—6 ft. Suspended Vanner

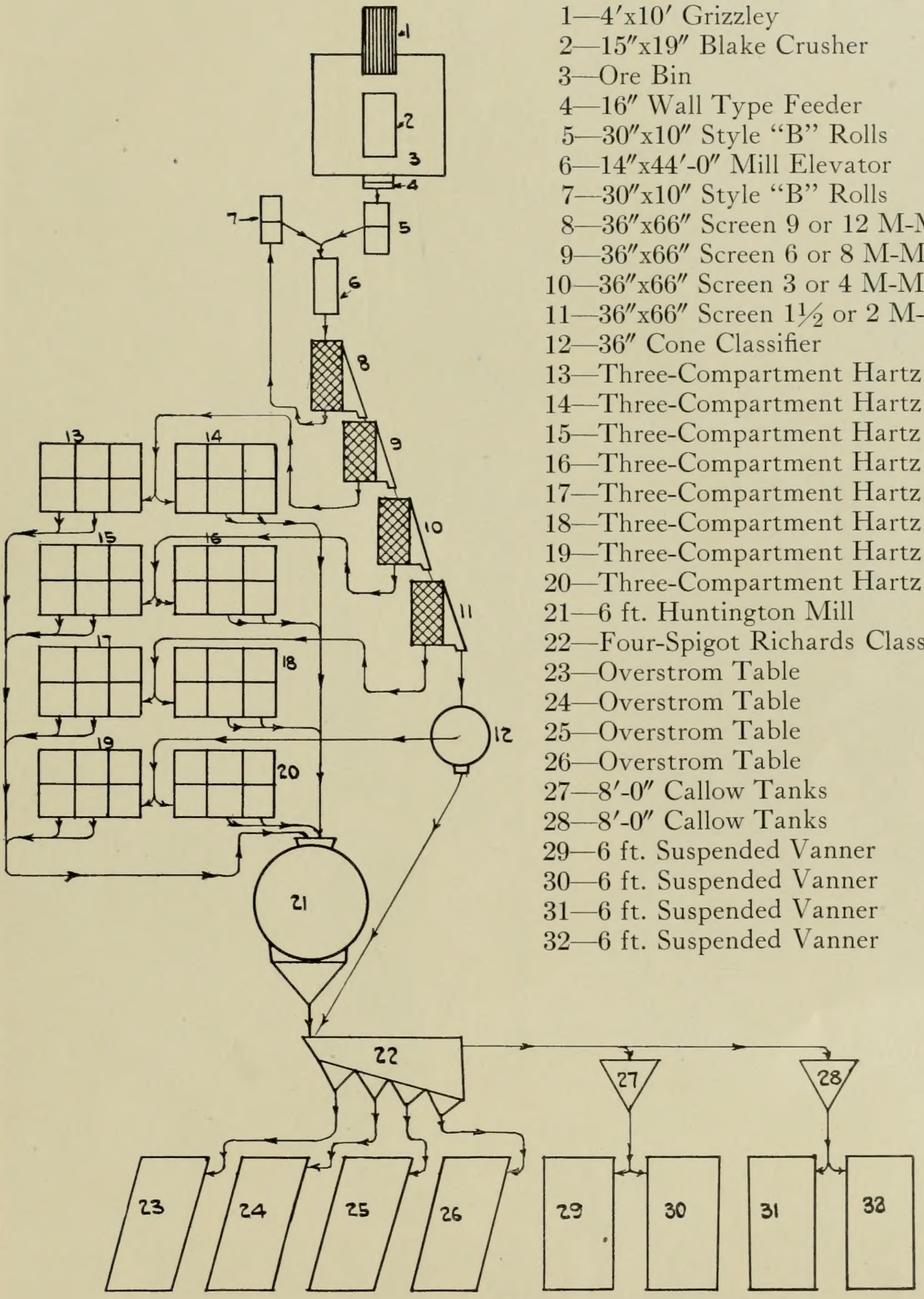
Flow Sheet of 150 to 200 Ton Concentrating Mill Using Hancock Jig and Richards Classifiers

Plate 5420



Plan of 150 to 200 Ton Concentrating Mill Using Hartz Jigs

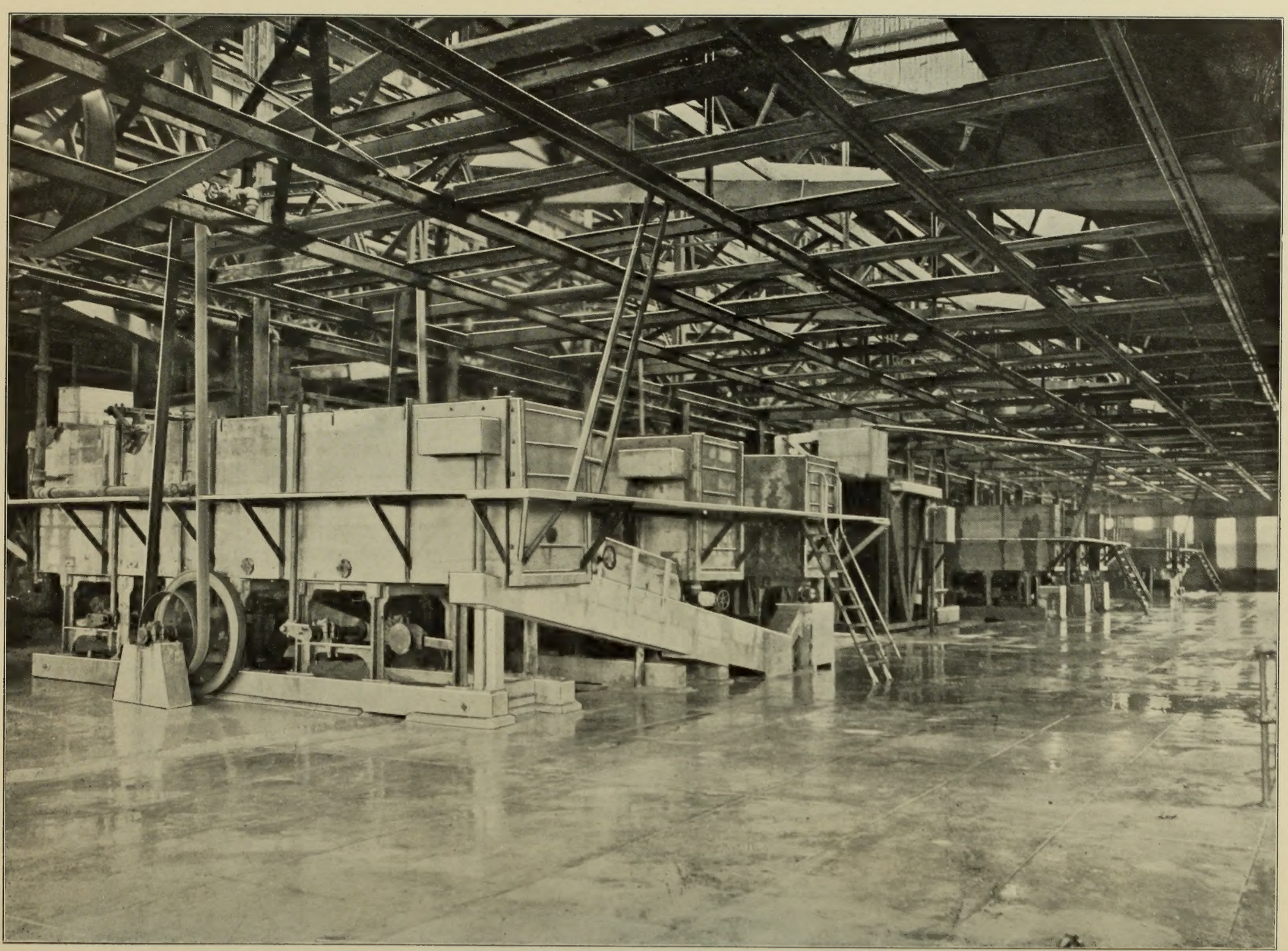
Plate 5309



1—4′x10′ Grizzley
2—15″x19″ Blake Crusher
3—Ore Bin
4—16″ Wall Type Feeder
5—30″x10″ Style "B" Rolls
6—14″x44′-0″ Mill Elevator
7—30″x10″ Style "B" Rolls
8—36″x66″ Screen 9 or 12 M-M Holes
9—36″x66″ Screen 6 or 8 M-M Holes
10—36″x66″ Screen 3 or 4 M-M Holes
11—36″x66″ Screen 1½ or 2 M-M Holes
12—36″ Cone Classifier
13—Three-Compartment Hartz Jig
14—Three-Compartment Hartz Jig
15—Three-Compartment Hartz Jig
16—Three-Compartment Hartz Jig
17—Three-Compartment Hartz Jig
18—Three-Compartment Hartz Jig
19—Three-Compartment Hartz Jig
20—Three-Compartment Hartz Jig
21—6 ft. Huntington Mill
22—Four-Spigot Richards Classifier
23—Overstrom Table
24—Overstrom Table
25—Overstrom Table
26—Overstrom Table
27—8′-0″ Callow Tanks
28—8′-0″ Callow Tanks
29—6 ft. Suspended Vanner
30—6 ft. Suspended Vanner
31—6 ft. Suspended Vanner
32—6 ft. Suspended Vanner

Flow Sheet of 150 to 200 Ton Concentrating Plant Using Hartz Jigs

Plate 5813



View of Nine Hancock Jigs Installed in the Federal Lead Company's Mill, Flat River, Mo.

HANCOCK JIGS AT THE FEDERAL LEAD COMPANY'S MILL, FLAT RIVER, MISSOURI.

Allis-Chalmers Company recently furnished the above company 9 Hancock Jigs; before the installation of these the jigging was done entirely on Hartz Jigs. The capacity of the mill, when using Hartz Jigs, was rated at 2,400 tons per 24 hours; with their system of Hartz Jigs the size of ore entering the mill was through 9 m/m. This feed was sized on screens as follows:

Through 9 m/m on 7 m/m.
Through 7 m/m on 4 m/m.
Through 4 m/m on 2 m/m.
Through 2 m/m less classifier overflow.

Each size was delivered to a separate group of Hartz Jigs. The re-ground middlings were sized accordingly. This sizing operation required 16 revolving screens for each of the three double sections into which this mill was divided.

There were operating in each double section 28-3 compartment, 12-2 compartment and 4-1 compartment Hartz Jigs, making a total for the whole mill of 132-plunger jigs, covering a floor space of 14,400 sq. ft. These jigs and elevators, driven from the same motors, required an average of 294 H. P. with the tonnage as stated above.

The nine HANCOCK JIGS, as operated at the present time, handle a feed ranging in size from 9 m/m to 1m/m; the capacity of the mill with the Hancock Jigs is rated at 3,600 tons per 24 hours, or 1,200 tons per double section. These nine Hancock Jigs with line shafting require 45 H. P. under maximum load.

The sizing of material for the Hancock Jigs is made on 6-48″x9′ revolving screens for each double section, or a total of 18 screens for the Hancock Jig mill handling 3,600 tons per 24 hours, against 48 screens for sizing the feed for the Hartz Jigs mill handling 2,400 tons per 24 hours.

The Hancock Jigs have demonstrated their ability to operate successfully on this unsized feed of 9 m/m to 1m/m, the average product at the Federal Mill being as follows:

First three hutches of each jig concentrates 72% lead.
Fourth hutch each jig middlings, 11% lead.
Fifth hutch each jig middlings, 4% lead.
Sixth hutch each jig tailings, 0.7% lead.

It is interesting to note the rapid decline in values between the compartments producing middlings and tailings. This is due to the delicate adjustments that can be made on the Hancock Jig between the horizontal and vertical strokes.

The grade of the mineral product shows a high efficiency in cleaning, while a thorough search fails to locate any particles of free mineral in the middlings products.

Briefly, the installation of the nine Hancock Jigs in the Federal Lead Company's mill has brought about the following results in operation:

Saving of 300 H. P.
Saving of 36% of water used in *ENTIRE MILL.*
Decreased working floor space 11,100 sq. ft., or 77%.
Increased grade of total mill concentrates 4½%.
Increased capacity of total mill 1,200 tons per day, or 50%.
Total milling costs per ton have been decreased approximately 25%.

The above gives an idea of the tremendous savings that have been made in one of the many mills in which the Hancock Jig has been installed.

Allis-Chalmers Company's

PRINCIPAL PRODUCTS

AIR BRAKES

AIR COMPRESSORS

- Steam Driven
- Belt Driven
- Electrically Driven, Portable
- Electrically Driven, Stationary
- Hydraulic Driven

BLOWING ENGINES

CEMENT MACHINERY

- Ball Mills
- Ball Tube Mills
- Balls, Forged
- Crushing Rolls
- Elevators
- Feeders
- Gyratory Breakers
- Hoists
- Mixing Pans
- Perforated Metals
- Revolving Screens
- Rotary Coolers and Dryers
- Rotary Kilns
- Tube Mills
- Tube Mill Linings
- Tube Mill Pebbles

COAL MINING MACHINERY

- Barney Cars
- Crushing Rolls
- Hoisting Cages
- Revolving Screens
- Shaking Screens
- Ventilating Fans

CONDENSERS

- Barometric
- Jet

CRUSHING MACHINERY

- Ballast Plants
- Crushing Rolls
- Dumping Skips
- Elevators
- Gyratory Breakers
- Hoists
- Jaw Crushers
- Macadam Plants
- Perforated Metals
- Portable Crushing Plants
- Revolving Screens
- Quarry Cars

ENGINES

- Blowing Engines
- Corliss Engines
- Gas Engines
- Hoisting Engines
- Pumping Engines
- Rocking Valve Engines
- Rolling Mill Engines

PERFORATED METALS

FLOUR MILL MACHINERY

- Aspirators
- Bolters, Universal
- Bolting Cloth
- Bolting Cloth Cleaners
- Bran and Shorts, Dusters
- Bran Packers
- Conveyors, Spiral
- Corn Mills
- Fans
- Feed Mills
- Feed Screens
- Flour Dressers
- Flaking Machines
- Flour Feeders and Mixers
- Flour Packers
- Granulators
- Purifiers
- Reels
- Rolls
- Roller Mills
- Rolling Screens
- Scalpers

HOISTS

- Electric Driven
- Steam Driven

HYDRAULIC MACHINERY

- Water Turbines
- Turbine Governors

MINING MACHINERY

- Air Compressors
- Amalgam Appliances
- Chilian Mills
- Concentrating Plants
- Conveyors
- Copper Converting Plants
- Crushing Plants
- Cyanide Plants
- Elevators
- Frue Vanners
- Gold and Silver Mills
- Gyratory Breakers
- Hoisting Machinery
- Huntington Mills
- Jaw Crushers
- Jigs
- Lead Refining Plants
- Mine Ventilating Machinery
- Mortar Mills
- Ore Buckets
- Ore Cars
- Ore Feeders
- Prospecting Mills
- Roasting Furnaces
- Sampling Plants
- Skips
- Smelting Machinery
- Stamps, Atmospheric
- Stamps, Gravity
- Stamps, Steam
- Tube Mills, Wet and Dry

POWER TRANSMISSION MACHINERY

- Belt Tighteners
- Boxes
- Couplings
- Gears
- Hangers
- Pulleys
- Rope Sheaves
- Shafting

PUMPING MACHINERY

- Centrifugal Pumps
- Elevator Pumps
- Fire Service Pumps
- Geared Pumps
- "High Duty" Pumping Engines
- Hydraulic Transmission Pumps
- Mine Pumps
- Screw Pumps

SAW MILL MACHINERY

- Band Mills, Double Cutting
- Band Mills, Single Cutting
- Band Mills, Telescopic
- Band Re-saws, Horizontal
- Band Re-saws, Vertical
- Board Lifters, Steam
- Cant Flippers, Steam
- Canting Machine, Overhead
- Carriages
- Circular Saw Mills
- Conveying Machinery
- Cutting Off Saws, Steam Feed
- Edgers
- Edging Grinders
- Feeds, Steam, Direct Acting
- Feeds, Steam, Twin Engine
- Filing Room Tools
- Lath Mills and Bolters
- Live Rolls and Drives
- Log Chains
- Log Jacks
- Log Loaders
- Log Turners
- Niggers, Steam
- Rocking Valve Engines
- Set Works
- Slashers
- Steam Feed Valves
- Stock Lifters, Steam
- Transfers
- Trimmers

SUGAR MACHINERY

TIMBER TREATING AND PRESERVING MACHINERY

TURBINES—STEAM

TURBINES—WATER

ELECTRICAL APPARATUS

ALTERNATING CURRENT GENERATORS AND MOTORS

- Belted Type Generators
- Engine Type Generators
- Fly-wheel Type Generators
- Turbo Generators
- Water-wheel Type Generators
- Synchronous Frequency Changers
- Induction Motor Frequency Changers
- Synchronous Motor-Generator Sets
- Induction Motor-Generator Sets
- Synchronous Motors
- Synchronous Condensers
- Induction Motors
- Transformers
- Rotary Converters

DIRECT CURRENT GENERATORS AND MOTORS

- Belted Type Generators
- Engine Type Generators
- Small Bipolar and Multipolar Motors and Generaters
- Electric Railway Equipments, Motors, Controllers, etc.
- Multiple Voltage Balancing Sets
- Multiple Voltage Variable Speed Equipments

SWITCHBOARDS FOR DIRECT CURRENT AND ALTERNATING CURRENT